CAISO
Transmission Perspectives

Robin Smutny-Jones
Director, Regulatory Affairs

California ISO
Your Link to Power

Western Conference of Public Service Commissioners
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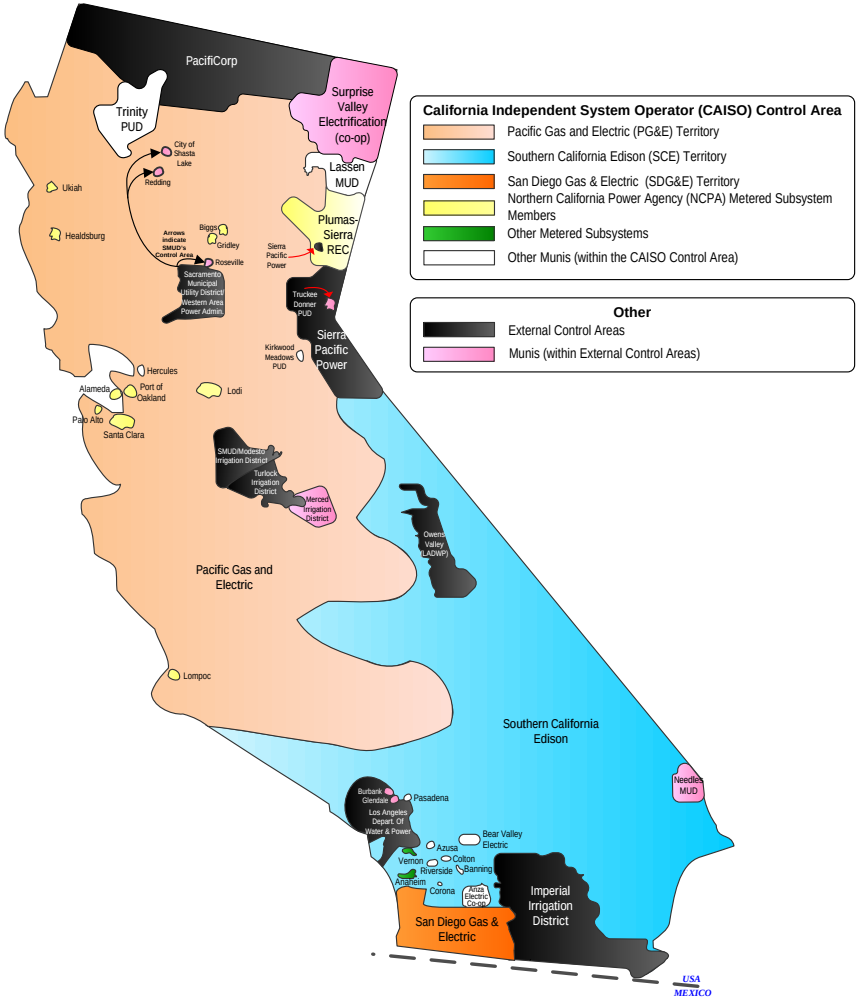
CAISO Control Area

CAISO Internal Utilities and External Control Areas



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CAISO – About Us

- Not for profit public benefit corporation regulated by FERC
- Serve 30 million people
- 25,526 circuit-miles of transmission lines
- Manage 40,000+ generation & transmission outage transactions each year and 30,000+ market transactions per day
- Summer 2006 Peak Load - 50,270 MW
- Committed to align with state and regional energy policies

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CAISO Transmission Planning – Key Objectives

- **Maintain reliability standards**
- **Facilitate non-discriminatory interconnection for generators**
- **Integrate renewables**
- **Support growing needs of system and market operations**
- **Eliminate uneconomic congestion**
- **Project review considers electrical configuration, not routing**

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Transmission Planning Process (TPP) Overview

- Compliant with the nine principles of FERC Order 890 including:
  - Improvements in transparency of the planning process
  - Regional Transmission Planning

- Planning Process (Overlapping 18 Month Cycles)
  - Request Window (August 15 – November 30)
  - Unified Planning Assumptions and Study Plan (January – April)
  - Technical Studies and Presentation of Results (May – October)
  - Development and Presentation of Plan (November – January)

- Regional Coordination Objectives
  - Collaborate with neighboring control areas
  - Ensure transmission plans are simultaneously feasible
  - Participate in the California Sub-regional Planning Group
  - State regulatory inputs
  - Participate in various WECC committees & other forums as needed

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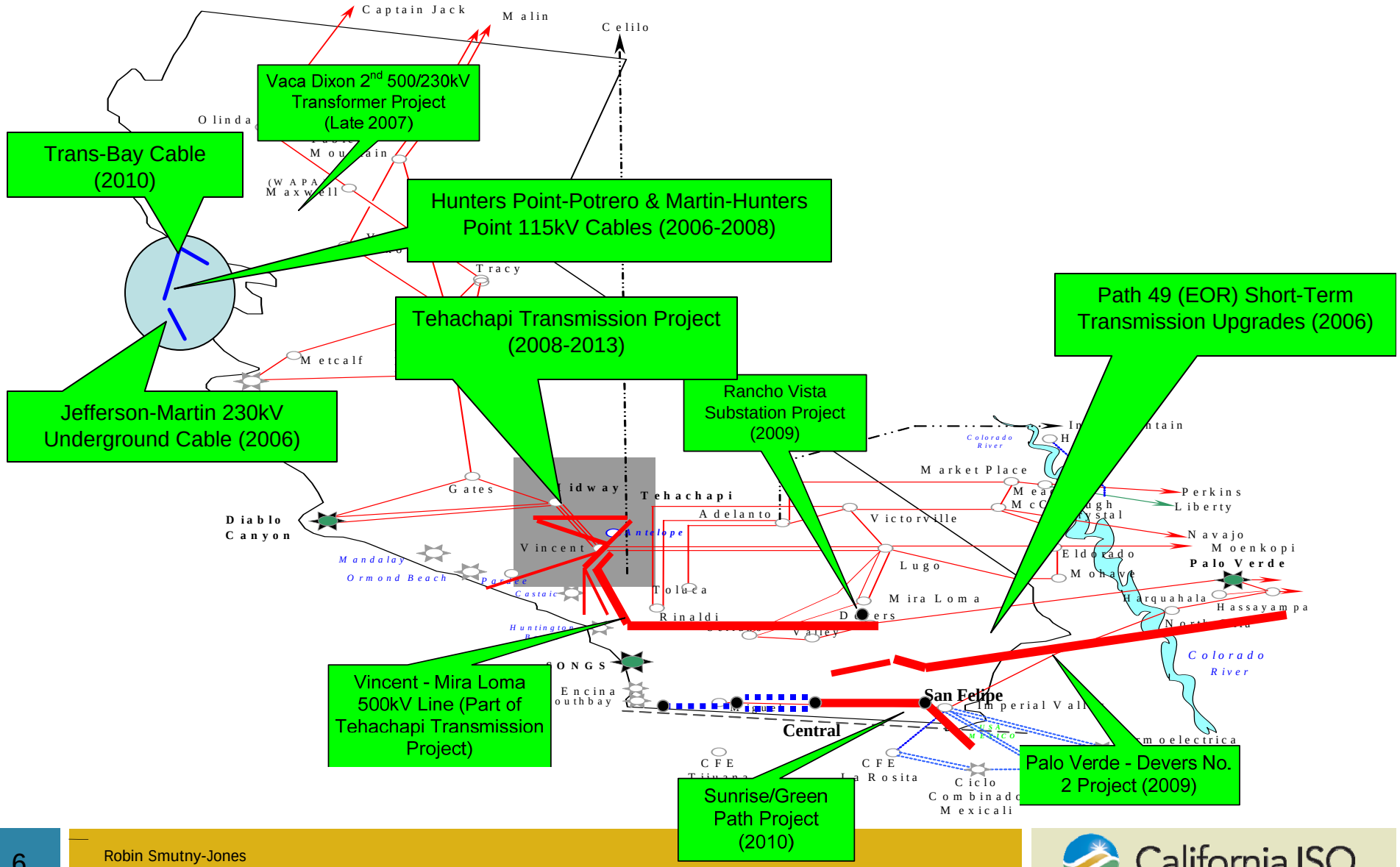
Major Projects Approved by the CAISO



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Renewable Integration Challenges

- Renewable Integration Study (RIS)
- Integration of Renewable Resources Program (IRRP)
- Once Through Cooling (OTC)
- Generation Interconnection Process Reform (GIPR)
- Renewable Energy Transmission Initiative (RETI)
- Location Constrained Resource Interconnection (LCRI)

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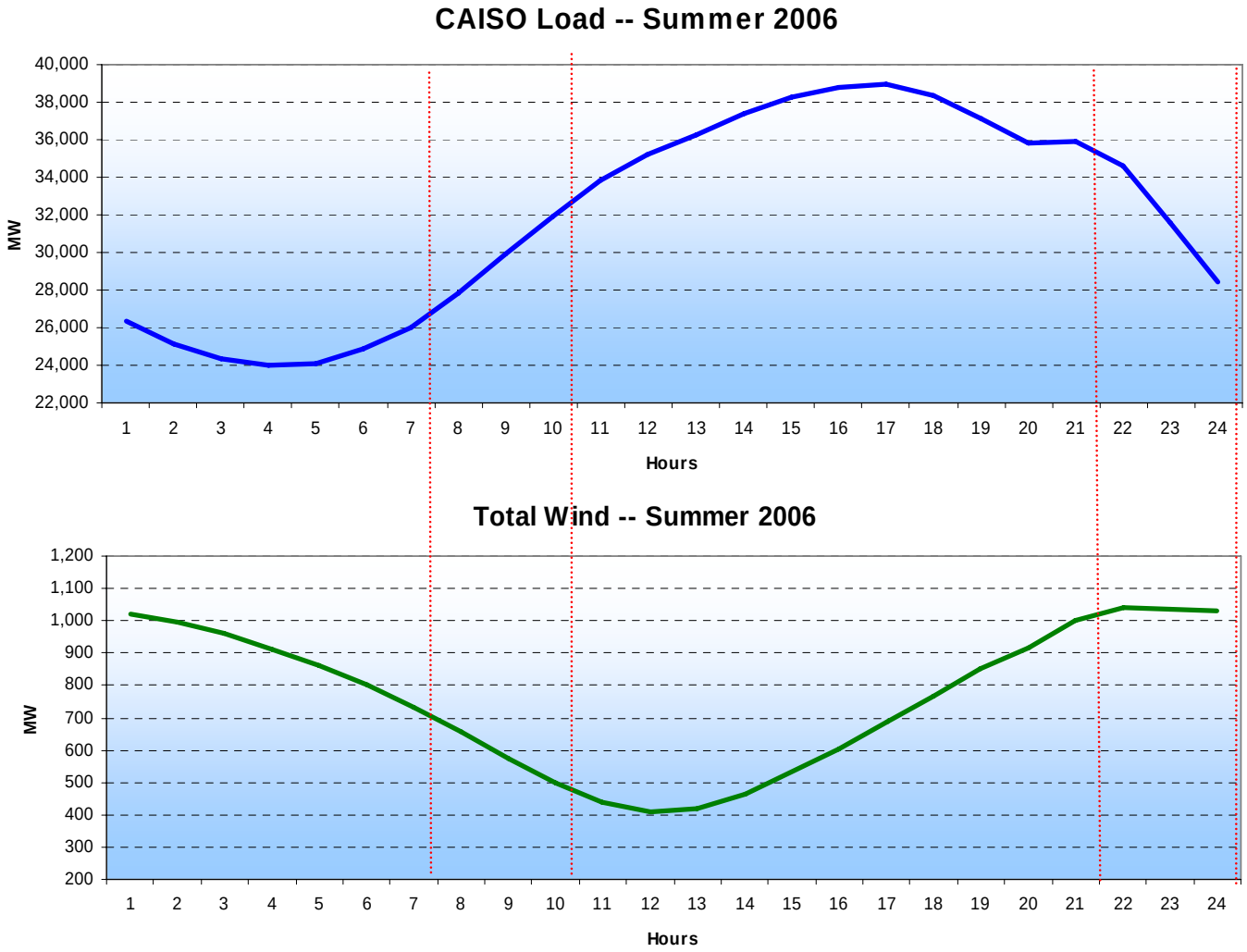
Wind Generation Tends to be Inversely Correlated to Daily Load Curve Creating Ramping Impacts



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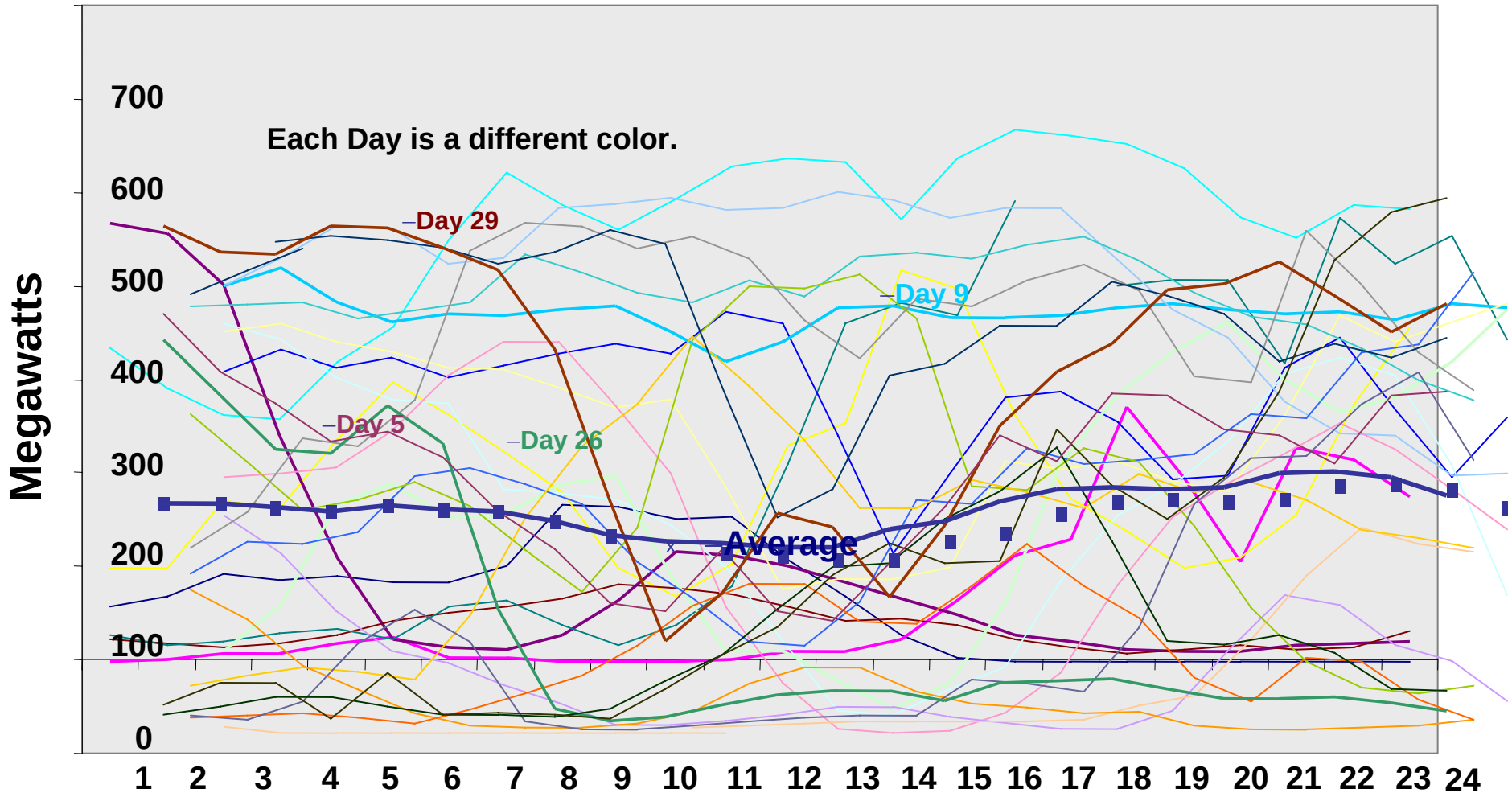
Tehachapi Area Wind Generation Varies Widely From Day to Day and Hour to Hour

The average for April 2005 is smooth, but the day-to-day variability is great, showing the importance of improved forecasting tools and telemetry to the operating floor.



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CAISO Renewable Integration Study

- Builds upon the California Energy Commission's intermittency analysis for the 2007 Integrated Energy Policy Report

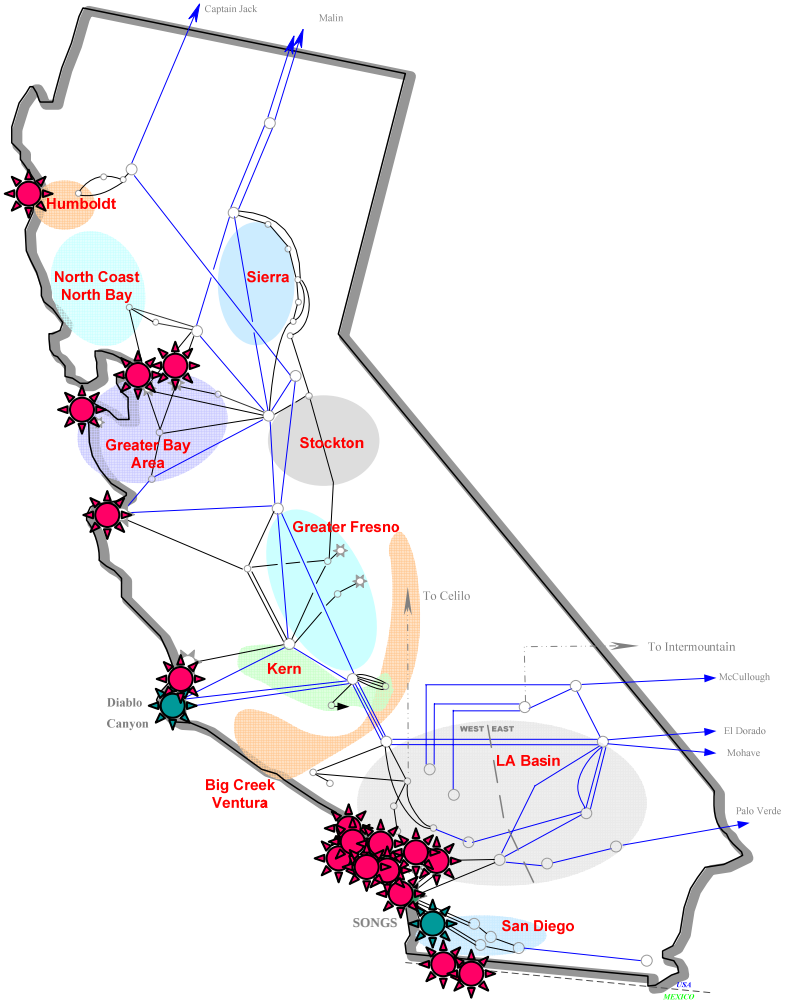
- Conclusions of *Integration of Renewable Resources Report*
  - Tehachapi Transmission Project needed to accommodate new wind resources
  - 4,200 MW of Tehachapi area wind generation can be integrated
  - Both transient stability and system damping satisfactory
  - Dynamic reactive capability at wind plants required
  - New wind plants should be Type 3 or Type 4 design
  - Adequate reactive margins exist following critical contingencies
  - Focus should be on operational issues
  - http://www.caiso.com/1ca5/1ca5a7a026270.pdf

- CAISO has initiated an Integration of Renewable Resources Program (IRRP)
  - Advanced demand response
  - Curtailment mechanisms
  - Improved technology
  - Better forecasting tools
  - Possible market products
  - http://www.caiso.com/1c51/1c51c7946a480.html

Once Through Cooling (OTC)

Many generators that use OTC technology today are located in areas that require generation within the load pocket to meet local capacity requirements. Additionally, many of these plants are needed to support the integration of renewables.

The California State Water Resources Control Board has proposed a OTC policy that puts 18,681 MW of this generation at risk of retiring or reducing capacity to comply.



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Generation Interconnection Process – Current State

- Current process defined by FERC Order 2003 was designed under conditions that no longer exist
  - Process assumed unused transmission capacity
  - Process designed around single large thermal plants close to load

Renewable generation is typically located in areas with inadequate transmission infrastructure.

- 201 Interconnection Requests (IRs) active today
  - Total 77,614 MW (CAISO all-time peak is 50,270 MW)
  - Renewable projects total approximately 50,000 MW

- IRs for renewable projects have been growing in response RPS goals
  - January 2006 5,700 MW
  - January 2007 11,000 MW
  - January 2008 42,526 MW

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The Generation Interconnection Process Reform (GIPR) Initiative seeks to resolve flaws in an innovative manner.

Problem	Solution
Inefficient serial study approach	• Study projects in groups • Allocate network upgrades pro rata • Feed projects with Interconnection Agreements (IAs) into CAISO TPP
Non-viable projects	• Increase financial commitments and consequences for delay or withdrawal • Accelerate site control requirement • Require binding financial commitment for signing IAs

The CAISO expects to file the GIPR in late July and implement in early September.

http://www.caiso.com/1f42/1f42c00d28c30.html

Renewable Energy Transmission Initiative (RETI)

- Initiated in September 2007 by California Public Utilities Commission (CPUC) and California Energy Commission (CEC) http://www.energy.ca.gov/reti
- Collaborative effort to identify and build transmission infrastructure to meet the state's RPS and greenhouse gas (GHG) mandates
  - Supervised by a *Coordinating Committee* comprised of CPUC, CEC, CAISO, Southern CA Public Power Authority, Northern CA Power Agency, and Sacramento Municipal Utility District
  - Primary workgroup is the *Stakeholder Steering Committee* comprised of key stakeholders including transmission owners/providers; utilities/power purchasers; environmental & public interest organizations; local, state & federal permitting agencies; generators; landowners; and others
- Work is organized into three phases
  - Competitive Renewable Energy Zone (CREZ) identification (August 2008)
  - Conceptual transmission plan (approximately15 months)
  - Detailed transmission plan & initiation of permitting process for priority transmission projects

Locational Constrained Resource Interconnection

- Financing mechanism for the construction of transmission to connect location constrained resources to the grid
- Makes it feasible for smaller renewable projects to interconnect with the transmission system
- Generators pay pro rata share of new transmission costs as project comes on line
- LCRIF Tariff is considered by FERC as a model for other ISO/RTOs
- http://www.caiso.com/1816/1816d22953ec0.html

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Conclusion

- Transmission Planning can no longer be “Business as Usual”
- GHG has reshaped energy policy paradigm and landscape
- Regional integration & coordination are more important than ever
- Failure to “connect the dots” will:
  - Lead to unnecessary expense and duplication
  - Potentially exacerbate climate and reliability challenges

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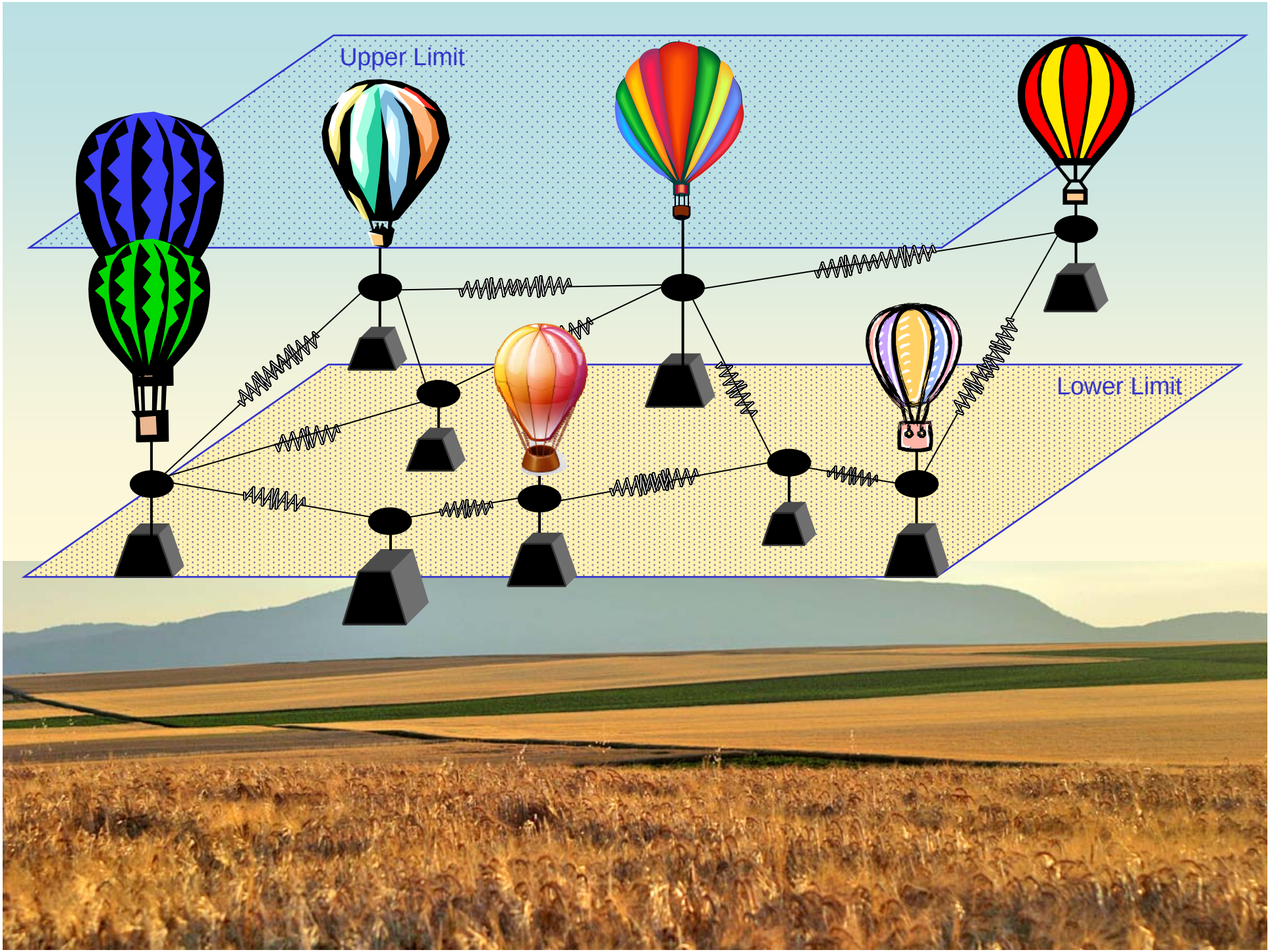
Upper Limit
Lower Limit